IN THE CLAIMS:

Please amend claims 1, 3, 7-10, 15, 17, and 20-25, as set forth below.
Please cancel claim 6.

Complete Listing of the Claims

Upon entry of the present amendment, the claims will stand as follows. The following listing of the claims will replace all prior versions and listings of the claims in the present application:

1. (Withdrawn, Currently amended) A method for producing a high density CNT film or pattern having ~~a~~ carboxyl ~~group~~groups, exposed on its surface, which comprises the steps of:

(a) reacting a substrate having amine groups exposed on the surface or a substrate having amine groups exposed in a ~~patterned substrate~~ pattern with CNT having exposed carboxyl groups to form a CNT single layer or single layer pattern on the surface of the substrate by amidation reaction between the amine ~~group~~groups and the carboxyl ~~group~~groups;

(b) reacting the CNT single layer or single layer pattern with ~~a~~ an organic diamine ~~type organic compounds~~ to modify the CNT single layer with ~~an~~ organic amine ~~group~~groups and reacting the organic amine groups with the CNT having exposed carboxyl groups to laminate a CNT layer thereon; and

(c) repeating the step (b) ~~n times~~ to form laminated CNT layers ~~and organic amine groups laminated alternately for n times~~, thereby forming a high density CNT film or pattern having exposed carboxyl groups.

2. (Withdrawn) The method according to claim 1, wherein the substrate is selected from the group consisting of silicon, glass, melted silica, plastics and PDMS.

3. (Withdrawn, Currently Amended) The method according to claim 1, wherein the substrate having ~~the amino functional~~ amine groups exposed on its surface is prepared by treating the substrate with aminoalkyloxysilane.

4. (Withdrawn) The method according to claim 1, wherein the substrate having the amine groups exposed in a pattern is prepared by forming a photoresist or organic supra-molecule pattern on the substrate having the exposed amine groups.

5. (Withdrawn) The method according to claim 1, wherein the substrate having the amine groups exposed in a pattern is prepared by forming a photoresist or organic supra-molecule pattern on a substrate, followed by treatment with aminoalkyloxysilane.

6. (Cancelled)

7. (Currently amended) A high density carbon nanotube (CNT) film or pattern which is prepared by ~~the~~ a method ~~according to claim 1~~ comprising the steps of:

(a) reacting a substrate having amine groups exposed on the surface or a substrate having amine groups exposed in a pattern with CNT having exposed carboxyl groups to form a CNT single layer or single layer pattern on the surface of the substrate by amidation reaction between the amine groups and the carboxyl groups;

(b) reacting the CNT single layer or single layer pattern with an organic diamine to modify the CNT single layer with organic amine groups and reacting the organic amine groups with the CNT having exposed carboxyl groups to laminate a CNT layer thereon; and

(c) repeating step (b) to form laminated CNT layers, thereby forming a high density CNT film or pattern having exposed carboxyl groups

~~, and has a carboxyl group exposed on its surface~~.

8. (Currently amended) A method for fabricating a CNT-biochip comprising bio-receptors fixed to ~~the~~ carboxyl ~~group~~groups exposed on the CNT film or pattern according to claim 7 by chemical or physicochemical bond, in which ~~the bio-receptors have~~ each bio-receptor has a functional group capable of binding to ~~the~~ a carboxyl group.

9. (Currently amended) The method according to claim 8, wherein the chemical functional group capable of binding to a carboxyl group is an amine group or a hydroxyl group.

10. (Currently amended) A CNT-biochip which is prepared by the method according to claim 8, and comprising bio-receptors fixed to ~~the~~ carboxyl ~~group~~groups exposed on the CNT film or pattern by chemical or physicochemical bond, in which ~~the bio-receptors have~~ each bio-receptor has a functional group capable of binding to ~~the~~ a carboxyl group.

11. (Original) The CNT-biochip according to claim 10, wherein the bio-receptor is selected from the group consisting of a enzyme substrate, a ligand, an amino acid, a peptide, protein, DNA, RNA, PNA, lipid, a cofactor and a carbohydrate.

12. (Withdrawn) The CNT-biochip according to claim 11, wherein the bio-receptor is DNA.

13. (Original) A method for detecting a target biomaterial capable of binding to or interacting with a bio-receptor, wherein the method is characterized by using the CNT-biochip according to claim 10.

14. (Withdrawn) A method for detecting DNA hybridization, wherein the method is characterized by using the CNT-DNA chip according to claim 12.

15. (Withdrawn, Currently Amended) A method for producing a high density CNT film or pattern having ~~a~~ exposed chemical functional ~~group~~groups selected from the group consisting of amine ~~group~~groups, aldehyde ~~group~~groups, hydroxyl ~~group~~groups, thiol ~~group~~groups and ~~halogen~~halogens, ~~exposed~~ on its surface, which comprises the steps of:

(a) reacting a substrate having amine groups exposed on the surface or a substrate having amine groups exposed in a pattern with CNT having exposed carboxyl groups to form a CNT single layer or single layer pattern on the surface of the substrate by amidation reaction between the amine ~~group~~groups and the carboxyl ~~group~~groups;

(b) reacting the CNT single layer or single layer pattern with ~~a~~ an organic diamine ~~type organic compound~~ to form an organic amine layer on the CNT single layer and reacting the organic amine groups with the CNT having exposed carboxyl groups to laminate a CNT layer thereon;

(c) repeating the step (b) ~~n times~~ to form laminated CNT layers ~~and organic amine layers laminated alternately for n times~~, thereby forming a high density CNT film or pattern having exposed carboxyl groups; and

(d) modifying the high density CNT film or pattern having exposed carboxyl groups with a chemical compound having both a functional group capable of binding to ~~the~~ a carboxyl group and a chemical functional group selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen.

16. (Withdrawn) The method according to claim 15, wherein the substrate is selected from the group consisting of silicon, glass, melted silica, plastics and PDMS.

17. (Withdrawn, Currently amended) The method according to claim 15, wherein the substrate having ~~the amino functional~~amine groups exposed on its surface is prepared by treating the substrate with aminoalkyloxysilane.

18. (Withdrawn) The method according to claim 15, wherein the substrate having the amine groups exposed in a pattern is prepared by forming a photoresist or organic supra-molecule pattern on the substrate having the exposed amine groups.

19. (Withdrawn) The method according to claim 15, wherein the substrate having the amine groups exposed in a pattern is prepared by forming a photoresist or organic supra-molecule pattern on a substrate, followed by treatment with aminoalkyloxysilane.

20. (Withdrawn, Currently amended) The method according to claim 15, wherein the chemical functional group capable of binding to a carboxyl group is an amine group or a hydroxyl group.

21. (Withdrawn, Currently amended) The method according to claim 15, wherein the ~~chemicals~~ chemical compound having both ~~the~~ a functional group capable of binding to a carboxyl group and ~~the~~ a chemical functional group selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen include H2N-R1-NH2, H2N-R2-

CHO, H2N-R3-OH, H2N-R4-SH, or H2N-R5-X in which R1, R2, R3, R4 and R5 are independently a C1-20 saturated hydrocarbon, un-saturated hydrocarbon or aromatic organic group and X is halogen element.

22. (Currently amended) A high density CNT film or pattern which is prepared by ~~the~~ a method ~~according to claim 15,~~ comprising the steps of:

(a) reacting a substrate having amine groups exposed on the surface or a substrate having amine groups exposed in a pattern with CNT having exposed carboxyl groups to form a CNT single layer or single layer pattern on the surface of the substrate by amidation reaction between the amine groups and the carboxyl groups;

(b) reacting the CNT single layer or single layer pattern with an organic diamine to form an organic amine layer on the CNT single layer and reacting the organic amine groups with the CNT having exposed carboxyl groups to laminate a CNT layer thereon;

(c) repeating step (b) to form laminated CNT layers, thereby forming a high density CNT film or pattern having exposed carboxyl groups; and

(d) modifying the high density CNT film or pattern having exposed carboxyl groups with a chemical compound having both a functional group capable of binding to a carboxyl group and a chemical functional group selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen;

~~and~~ wherein the high density CNT film or pattern has ~~a~~ exposed chemical functional ~~group~~groups ~~exposed~~ on its surface, in which the chemical functional ~~group is~~ groups are selected from the group consisting of amine ~~group~~groups, aldehyde ~~group~~groups, hydroxyl ~~group~~groups, thiol ~~group~~groups and ~~halogen~~halogens.

23. (Currently amended) A method for fabricating a CNT-biochip comprising bio-receptors fixed to the chemical functional ~~group~~groups ~~selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen, exposed on the CNT film or pattern~~ according to claim 22 ~~and~~ by chemical or physicochemical bond, in which the bio-receptors each have a functional group capable of binding to ~~the~~ a chemical functional group.

24. (Currently amended) A method according to claim 23, wherein the ~~chemicals~~ chemical compound having both ~~the~~ a functional group capable of binding to a carboxyl group and ~~the~~ a chemical functional group selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen include H2N-R1-NH2, H2N-R2-CHO, H2N-R3-OH, H2N-R4-SH, or H2N-R5-X in which R1, R2, R3, R4 and R5 are independently a C1-20 saturated hydrocarbon, un-saturated hydrocarbon or aromatic organic group and X is halogen element.

25. (Currently amended) A CNT-biochip which is prepared by the method according to claim 23~~, and comprising bio-receptors fixed to the chemical functional group exposed on the CNT film or pattern and selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen by chemical or physicochemical bond, in which the bio-receptors have a functional group capable of binding to the chemical functional group~~.

26. (Original) The CNT-biochip according to claim 25, wherein the bio-receptor is selected from the group consisting of a enzyme substrate, a ligand, an amino acid, a peptide, protein, DNA, RNA, PNA, lipid, a cofactor and a carbohydrate.

27. (Withdrawn) The CNT-biochip according to claim 26, wherein the bio-receptor is DNA.

28. (Original) A method for detecting a target biomaterial capable of binding to or interacting with a bio-receptor, wherein the method is characterized by using the CNT-biochip according to claim 25.

29. (Withdrawn) A method for detecting DNA hybridization, wherein the method is characterized by using the CNT-DNA chip according to claim 27.

30. (Original) A multilayer CNT structure, comprising a substrate and multiple CNT layers on the substrate, wherein said multiple CNT layers include (i) CNTs bonded to the substrate via peptide linkages (-NHC(O)-), (ii) CNTs bonded to other CNTs via linkers including CNT-connecting peptide linkages (-NHC(O)-) and (iii) CNTs having pendant carboxyl functionality.

31. (Original) A multilayer CNT structure according to claim 30, further including a bio-receptor coupled thereto.

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